

Remarks

Applicants' response to the rejection under 35 U.S.C. 112, first paragraph

Applicant is dealing with this rejection by amending claim 25, the only independent claim remaining in the application, to remove the "abutting parting planes" language.

The claim now reads as follows:

25. A method of making a lug for a joint that joins carbon fiber tubes in a bicycle frame,
the method employing a closable mold that may be closed around the tubes and the method comprising the steps of:
 making a lay-up of at least carbon fibers and a matrix material around the tubes at the joint, the lay-up forming a continuous wrap around the tubes and being enclosed by the closed mold;
 including an expandable element that is also enclosed by the closed mold;
 closing the mold around the lay-up, the tubes at the joint, and the expandable element; and
 curing the layup while the mold is closed, the cure of the layup causing expansion of the expandable element and the expansion compacting the enclosed layup against the tubes such that voids in the lug are prevented.

The dependent claims have been amended as required to bring them into conformity with claim 25; as Examiner will immediately see, the dependent claims as amended are fully supported by the specification as filed.

Support for claim 25 as amended

Instead of the term "a mold having abutting parting planes", claim 25 now uses the term "closable mold that may be closed around the tubes" The term "closable mold" does not occur in Applicants' Specification, but that is not required. MPEP rev 5 discusses the written description requirement in detail in Sections 2163-2163.07. A consequence of the written description requirement with regard to claims that are amended during prosecution is the following:

While there is no *in haec verba* requirement, newly added claim limitations must be supported in the specification through express, implicit, or inherent disclosure. (MPEP 2163(B), MPEP rev. 5, 2100-168)

5 *in haec verba* means "in those words", i.e., there is no requirement that the words used in a claim to describe a limitation appear in the Specification. What *is* required is set forth in *New Railhead Mfg., L.L.C. v. Vermeer Mfg. Co.*:

10 ("The disclosure as originally filed does not have to provide *in haec verba* support for the claimed subject matter at issue."). Identity of that which is described, however, is necessary: "What is claimed by the patent application must be **[**15]** the same as what is disclosed in the specification" Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722, 152 L. Ed. 2d 944, 122 S. Ct. 1831, 1840 (2002); accord Lockwood v. American Airlines, Inc., 107 F.3d 1565, 1572, 41 U.S.P.Q.2D (BNA) 1961, 1966 (Fed. Cir. 1997) (298 F.3d 1290, 1298, Fed. Cir., 2002)

The newly-added claim limitation appears as follows in claim 25 as amended in the second RCE:

20 the method employing a *closable mold* that may be *closed around the tubes* (emphasis added)

The issue between Examiner and Applicant is thus whether the Specification as filed discloses "closable molds that may be closed around the tubes", i.e., molds in which, when the lug is being made, the mold is closed around the tubes and the space in which
25 the lug is formed. Evidence that the disclosed molds are closable and that they are closed around the tubes may be found in FIGs. 6-9. The Figures are based on drawings used in the production of the frames.

FIG. 6 is described as follows at page 6, lines 19-22 of the Specification as filed:

30 In one version of the process, shown in FIG. 6, the mold is a captured-silicon mold 603. A side view 604 and a top view 602 show a frame 201 with molds attached to each of the main joint areas; detailed view 606 shows a detail of mold 603 for the head lug 117. At 611 is shown the top tube, at 609 the down tube, and at 613 the header tube.

35 Top view 602 shows the location of a vertical cross section A-A of the frame; the cross section is taken on the centerline of the frame and shows one side of each of the molds.

As clearly indicated by the label A-A, side view 604 is this cross section. As is further apparent from the fact that top view 602 shows the mold sides extending to the centerline, the molds enclose the layup, the tubes, the expandable element (here silicon 607), and the layup shown in FIGs. 9 and 10 for the lug. There is no gap between the two parts of the closed mold.

The foregoing interpretation of FIG. 6 is confirmed by FIGs. 7 and 8. Top view 703 of FIG. 7 shows the closed molds on the top tube. Again, the molds enclose the tubes, the expansive element, and the layup and there is no gap between the two parts of the closed mold. The top view at the bottom left of FIG. 8 shows the same thing.

The method set forth in the claim is described at page 6, lines 2-14:

In general, lugs are constructed in frames 201 and 401 as follows: at the points where the tubes of the frame come together, termed herein *joints*, the tubes are mitered to make intimate contact with each other. Pre-impregnated carbon fiber fabric is laid up around the joint to form a lug. The kind of fabric and the number of layers used depend on the particular lug and the size of the frame. The carbon fiber fabric is cut in a way that tends to eliminate seams and approximate a continuous fiber lay-up. A mold is then placed around the tubes and the lug and the lug is ramped up to a set temperature at a fixed rate, held at the set temperature, and then permitted to cool for a fixed period of time. This procedure cures the lug. As will be explained in more detail later, an expandable material either in the mold or in the lug expands to force the lay-up tightly against the frame and the mold. The expandable material compacts the carbon fiber fabric evenly throughout the lug. The use of the expandable material together with the pre-impregnated fabric prevents the occurrence of voids in the lugs. Such voids are a common cause of failure in carbon fiber structures.

30 **Patentability of claim 25 over Bishop and Trimble**

The disclosure of the references

Bishop

Bishop discloses a technique for making a bicycle frame out of tubes. The joints in the frame have lugs made of woven graphite fiber. The process used to make the frame is described beginning at column 3, line 29. It uses a mold of which one half, indicated by the reference number 20, is shown in FIG. 2. As shown in FIG. 4, to make the frame,

you first lay two sheets of impregnated graphite fabric into the hollow provided in the mold for the lug. Then you fill the areas between the hollows with mixture 42, which is a putty-like mixture of microballoons and adhesive. The purpose of adding mixture 42 is to make fillets between the tubes being joined by the lug, as may be seen from col. 2, lines 66-68. The next stage is to put 4 more sheets of fabric into the hollows and over mixture 42 (see FIG. 6). You do the same with the other half of the mold. Then you wrap the frame with two sheets of fabric at the location of the lug. Finally, you put the wrapped frame into the mold, put the other half of the mold on top, and bolt the halves together. As is clear from col. 5, lines 4-10 and 13- 22 and FIG. 6, showing "flash" 40, the halves of the mold do not completely enclose the tubes of the frame or the layup. Pressure can thus be brought to bear on the layup simply by tightening the bolts. The lugs set at room temperature by exothermic action. As can be seen from Bishop's FIG. 6, disadvantages of Bishop's technique include the "flash", which must be removed after the cure is complete, and the fact that the layers of the layup's fabric cannot be wrapped continuously around the tube in the manner shown in Applicant's FIG. 9.

It should also be pointed out here that Examiner Kuhns took the microballoon and matrix mixture 42 (FIG. 4), described at col. 3, lines 55-65, to be the "expandable element located between the mold and the tube" of previous versions of claim 25. There is no indication whatever in Bishop that the microballoon and matrix mixture reacts to the curing process any differently from the other components of the layup.

The disclosure of Trimble

Trimble discloses a method for molding a monocoque bicycle frame. Such a frame of course has neither tubes nor lugs. The process of molding the frame is disclosed at col. 5, line 61-col. 7, line 16. In summary, the cavities in a closable mold are lined with the layup for the frame and pressure is applied from within the cavity to force the layup against the walls of the cavity. Two methods of applying pressure are disclosed: a bladder which is inflated in the mold cavity and a foamable resin composition (col. 6, line 65-col. 7, line 16).

The rejection under 35 U.S.C. 103

Examiner Kuhns' rejection of claim 25 as obvious over Bishop in view of Trimble is grounded as follows:

5 The fabric layers 40 of Bishop extend into the mold parting plane resulting in the formation of "substantial portions of flash" which must be subsequently cut away ... But Trimble, also in a method of forming a bicycle frame, illustrates in Figures 2A and 2B and explicitly discloses closing the mold along lines of abutment (the parting plane) at column 190, lines 51-55, in a manner in which the layers do not extend into the
10 parting plane. (Office Action of 6/14/2007, page 2)

Why the Bishop and Trimble references cannot be combined to reject claim 25

The problem with the above rejection is that the references cannot be combined as required to disclose the method of claim 25. Bishop discloses the use of a mold to make
15 lugs for a bicycle frame made of tubes, but Bishop's mold is not closable and is thus not "a closable mold that may be closed around the tubes", as required by claim 25. Additionally, Bishop's technique does not "include an expandable element", as required by claim 25.

20 Trimble discloses a closable mold, and the use of an expandable element, but Trimble's mold is used to make a monocoque frame, or in terms of the claim language, there are no tubes in Trimble's frame for Trimble's closable mold to be closed around. Because there are no tubes, Trimble's "expandable element" does not expand to "compact[] the enclosed lay-up against the tubes such that voids in the lug are prevented", as required by
25 the claim.

Further, *because* Bishop's mold is not closable and has no expandable element and *because* Trimble's mold does not enclose tubes, the combined references disclose nothing about the technical problem solved by the invention of claim 25: namely, how one
30 compacts a lug for a bicycle frame made up of carbon fiber tubes if the lug is made using a closable mold. As set forth in claim 25, Applicant's invention solves this problem as follows:

curing the layup while the mold is closed, the cure of the layup causing expansion of the expandable element and the expansion compacting the enclosed layup against the tubes such that voids in the lug are prevented.

5 The combination of the Bishop and Trimble references does not disclose this solution. Bishop teaches only how to use a non-closable mold to compact the lay-up for such a lug. Because the mold is non-closable, the layup can be compacted simply by tightening the bolts that hold the mold together and there is no need whatever in Bishop for an expandable element. Trimble teaches the use of an expandable element and a closable
10 mold to make a monocoque frame, but Trimble's technique for compacting the layup that forms the monocoque frame will not work to compact lugs on a frame made of tubes. The reason the technique will not work is that the expandable element will expand against the insides of the tubes making up the frame and will have no effect whatever on the lay-up for the lugs.

15 Because Bishop teaches nothing about how to use an expandable element in a closable mold to compact the lay-up for a lug for a frame made up of tubes and Trimble also teaches nothing about how to use an expandable element in a closable mold to compact the lay-up for such a lug, the combination of the references does not disclose all of the
20 limitations of the invention of amended claim 25 and the claim as amended is patentable over the references.

Patentability of the dependent claims

The dependent claims are of course all patentable because they are dependent from claim
25 25, which is patentable. Many of the dependent claims, however, include additional limitations which are not found in the references, and these claims are consequently patentable in their own rights as well.

Claims 20 and 23

30 The additional limitations in these claims are addressed to the technique for making a layup for a lug which is shown in FIGs. 9 and 10 and described at page 8, lines 1-15. Nothing similar to these techniques is disclosed in Bishop or Trimble.

Claim 27

Here, the additional limitation is the technique for making a tapered lug; Bishop does not disclose tapered lugs and Trimble discloses nothing whatever about lugs.

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Claims 28-31

The additional limitations in these claims are directed to the species of the invention in which the expandable element is included by lining the mold with silicon (claim 28) and in which the expandable element is included by including a layer of expandable syntactic foam in the layup. Bishop does not disclose expandable elements at all; Trimble's expandable element is not silicone. Though Trimble may use syntactic foam as an expandable element, the syntactic foam is not included as a layer in the layup.

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Conclusion

In the foregoing, Applicant has demonstrated that the claim 25 as amended is fully supported by the Specification as originally filed, that amended claim 25 is patentable over the combination of the Bishop and Trimble references, and that many of the dependent claims include additional limitations that are not disclosed in the Bishop and Trimble references and are consequently patentable both in their own rights and because they are dependent from amended claim 25. This *Submission* consequently fulfills the requirements of 37 C.F.R. 1.111. Applicant therefore respectfully requests that Examiner withdraw the holding of abandonment as provided by 37 C.F.R. 1.114(c) and continue with the examination of the application. Accompanying this *Submission* are the RCE fee of \$405.00 and a fee of \$230.00 for a two-month extension of time.

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Respectfully submitted,

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